24 THIN LAYER CHROMATOGRAPHY (TLC)

24.1 Introduction to Thin Layer Chromatography

24.1.1 Objectives

Through completion of this module the trainee will have developed and demonstrated theoretical knowledge and/or practical skills to:

- Describe the theory and basic principles of thin layer chromatography;
- Select an appropriate mobile phase;
- Select an appropriate detection and/or development method; and
- Perform qualitative separations.

24.1.2 Required Readings

24.1.2.1 Braithwaite, A. and Smith, F. J., Chromatographic Methods, Chapman and Hall, New York, NY, 1985.

24.1.2.2 Moffat, A. C., Clarke's Isolation and Identification of Drugs, The Pharmaceutical Press, London, England, 1986, pp. 160-177.

24.1.3 Questions

The trainee will provide written answers to the following questions:

- Define the following:
  - Thin layer chromatography
  - Stationary phase
  - Mobile phase
  - Solvent front
  - R_f value
  - Adsorption
  - Absorption
  - Elution
  - Partition coefficient (K)
  - Polarity
  - Dipole moment
  - Dielectric constant
  - Visualizing reagent
- For the silica gel GF TLC plates, what are the “GF” components and what is their purpose?
- What is meant by quenching fluorescence?
- Why is silica typically chosen over alumina as a stationary phase?
- What is the general limit of detection of TLC? What factors influence this?
- What are “tailing” and “bearding”? What causes these to occur and what can be done to minimize these effects?
- What is an elutropic series? How will the polarity of solvents change when they are mixed together?
- Explain the interaction of the sample, mobile phase and stationary phase.
- Why do spots with larger R_f values generally have larger diameters than spots with relatively low R_f values?
- Does sample concentration have an effect on TLC migration? Why or why not?
- How can the results of TLC be documented?

24.1.4 Practical Exercises

24.1.4.1 The trainee will prepare a TLC bath and visualizing reagent, if applicable, as directed by the trainer.

24.1.4.2 The trainee will analyze a set of samples provided by the trainer and will document the TLC results.

19.1.5 Evaluation

19.1.5.1 The trainer will review the written answers to the questions with the trainee.

19.1.5.2 The trainer and the trainee will review and discuss the pertinent points of each of the required readings.

19.1.5.3 Review of practical exercises.

19.1.5.4 The trainee will be quizzed orally upon the subject matter.

24.2 Competency Evaluation and Mock Trial

The trainee may use thin layer chromatography when completing their subdiscipline competency test and may defend their results as a part of their mock trial in that subdiscipline.

If using thin layer chromatography in general chemical analysis, the supervisor will document completion of this TLC training section via an e-mail to the trainee.

24.3 Reading List

24.3.1 Braithwaite, A. and Smith, F. J., Chromatographic Methods, Chapman and Hall, New York, NY, 1985.

24.3.2 Moffat, A. C., Clarke's Isolation and Identification of Drugs, The Pharmaceutical Press, London, England, 1986, pp. 160-177.

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